Four species of Brachodidae new to the fauna of Europe (Sesioidea)

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Abstract. In the present work, four species of the genus *Brachodes* Guenée, 1845 (Brachodidae) are recorded from Europe for the first time. *B. tristis* (Staudinger, 1879) is reported from the Balkan peninsula (Greece, Bulgaria, Macedonia), *B. powelli* (Oberthür, 1922) from Italy, *B. nanetta* (Oberthür, 1922) from Spain and Portugal, and *B. beryti* (Stainton, 1867) from Greece. Furthermore, *B. powelli* **stat. rev.** is resurrected from synonymy with *B. appendiculata* (Esper, 1783). All species are figured and characterised.

Zusammenfassung. In der vorliegenden Arbeit werden von vier Arten der Gattung *Brachodes* Guenée, 1845 (Brachodidae) erstmals Nachweise für die Fauna Europas genannt. *Brachodes tristis* (Staudinger, 1879) wird vom Balkan (Griechenland, Bulgarien, Macedonien), *B. powelli* (Oberthür, 1922) aus Italien, *B. nanetta* (Oberthür, 1922) aus Spanien und Portugal sowie *B. beryti* (Stainton, 1867) aus Griechenland gemeldet. *B. powelli* **stat. rev.** wird aus der Synonymie mit *B. appendiculata* (Esper, 1783) genommen. Die genannten Arten werden abgebildet und charakterisiert.

Key words. Lepidoptera, Sesioidea, *Brachodes*, taxonomy, Europe.

Introduction

The European Brachodidae fauna is relatively poor in species and consists only of 'grass borers' of the genus *Brachodes* Guenée, 1845. Eleven species were listed when it was last summarised by Heppner (1996).

Lately, research on the Palearctic Brachodidae has intensified and it was shown that *Brachodes candefactus* (Lederer, 1858) (=*Atychia diacona* Lederer, 1858) and *Brachodes fallax* (Staudinger, 1900) are not present in Europe as was erroneously stated in the European checklist (cf. Heppner 1996; Kallies 1998, 2001). However, *Brachodes flavescens* (Turati, 1919), a distinct species described from Italy is missing from this list. Data on this species have been summarised by Bertaccini & Fiumi (2002).

In the course of revisional work on Palearctic Brachodidae, four species were discovered which had not previously been recorded for the European fauna. Records of these species are listed below, and diagnostic characters are given to separate them from similar congeners. Figures of genitalia are omitted here since they are not suitable for the determination of these species.

The name of one of the species recorded here from Europe for the first time, *Brachodes powelli* (Oberthür, 1922) **sp. rev.**, is resurrected from synonymy with *Brachodes appendiculata* (Esper, 1783). With these additions and systematic changes, the checklist of European Brachodidae now attains a total of 14 species.

Abbreviations

CAK – Collection of Axel Kallies, Berlin, Germany; CKS – Collection of Karel Spatenka, Prague, Czech Republic; MGAB – Museul de Istorie Naturala 'Grigore Antipa', Bucharest, Romania; MNHP – Museum National d'Histoire Naturelle, Paris, France; NHML – The Natural History Museum, London,

Great Britain; NHMW – Naturhistorisches Museum Wien, Austria; MNHB – Museum für Naturkunde, Berlin, Germany; NNHM – Nationaal Natuurhistorisch Museum, Leiden; ZMUC – Zoological Museum, University of Copenhagen; ZSM – Zoologische Staatssammlung München, Germany.

Systematics and Faunistics

Brachodes tristis (Staudinger, 1879) (figs 1, 2)

Material. Holotype (by monotypy) ♂ with labels: handwritten (Haberhauer?) 'Taurus | Haberhr.', handwritten (Staudinger) 'tristis Stgr.', printed 'Orig.' (on pink paper) (MNHB). GREECE: 3♂, Litochoron, 3–400 m, 14.–22.VI.1957, leg. Klimesch; 6♂, 3♀, Kamena, Vurla (Lamia), 6.–12.VI.1957, leg. Klimesch (Fig. 1); 1♂, 4♀, Peloponnesos, Zachlorou, Kalavrita, 26.VI.– 3.VII.1963, leg. Klimesch; 2♂, same data, but 13.–30.VI.1958; 1♂, same data, but 27.V.1963, leg. Klimesch (all ZSM); 1♂, Mt. Olympus (ZSM); 1♀, Str. Akrata-Diakopton-Kalavrita, 750 m, 14.VII.1995, leg. Lingenhöle (Fig. 2, CAK); 1♀, Peloponnesos, 15 km E Tripolis, 14.V.1990, 650 m, leg. Karsholt (ZMUC); 1♂, Peloponnesos, Chelmos (ZSM); 1♂, 2♀, Leptokaria, 26.–27.VI.1996, leg. Laštůvka; 2♂, 1♀, same data, but 23.–24.VI.1997 (CKS); 1♂, same data, but 24.VI.1998; 2♀, Peloponnesos, Vrontamas, 30.V.1999, leg. Laštůvka; 1♂, Peloponnesos, Kálavryta, 4.VI.1999, leg. Laštůvka; 1♂, Agios Haralambos, 27.V.1999, leg. Laštůvka; 1♂, Diakopto, 15.VI.1991, leg. Feik (all CKS); MACEDONIA: 1♂, Stari Dojran, 2.–10.VI.1955, leg. Klimesch (ZSM); BULGARIA: 1♂, 17.VIII.1978, Sajtan dere, leg. Krusek (CAK); 1♀, Pirin Mts., Region Sandanski, Liljanovo, 800 m, 26.V.–21.VI.1981, leg. Eichler (CAK).

Material from outside Europe. 1♂, LEBANON, leg. Nicholl (NHML).

This species was described from the Toros Mts in southern Turkey and is now reported from Europe (Greece, Macedonia, and Bulgaria) and the Lebanon for the first time.

B. tristis is related to *Brachodes appendiculata*. Males can be distinguished by the shape of the antennal processes (short and broad in *B. tristis*; long and narrow in *B. appendiculata*) and the dark fringe of the wings, especially the hindwings (white in *B. appendiculata*). Additionally, fresh specimens can be recognised by the dense orange-yellow scaling of the forewing which covers the narrow medial streak almost completely (scaling in *B. appendiculata* pale yellow to olive-yellow, medial streak whitish yellow and clearly visible). Female *B. tristis* can be separated by the dark and shining black wings (brownish black, often lighter at the base of the hindwing in *B. appendiculata*) and the entirely black scaling of head and legs (mixed with individual white scales in *B. appendiculata*).

Brachodes powelli (Oberthür, 1922) sp. rev. (fig. 3)

Material. ITALY: 1♂, Rom (ZSM); 1♂, 1♀, Aspromonte, Calabria, Serro Juncaria, 1700 m, 20.VI.1971, coll. Hartig (NHML); 1♂, Aspromonte, 1600–1800 m; 1♂, 1♀, Aspromonte, Cerasia, 1700 m, 3.VII.1920, leg. Stauder (NHMW); 2♂, Piemonte, Val di Susa (TO) Salbertrand, 1800–2000 m, 13.VI.1998, leg. Bassi (coll. Fiumi); SPAIN: 1♀, Almeria, 8. IV. 1994, leg. Lange & Hoppe (CAK).

Material from outside Europe. MOROCCO: 1♂, Haut Atlas, ca. 60 km ENE Taroudant, Tizi-n-Test, southern side, ca. 1800 m, 6.VI.1996, leg. Kallies (Fig. 3, CAK); 1♂, Taza, 15.–21.V.1930, Ebner (NHMW); 1♂, 1♀, Moyen Atlas, Aguelmane Si Ali (2070) 1–14.VII.1939, leg. Rungs (MNHP); 2♂, Moyen Atlas, Tizi Tarhzeft, 2200 m, 5.VII.1984, leg. et coll. De Prins; 1♂, Moyen Atlas, Col du Zad, 2200 m, 2.VII.1984, leg. et coll. De Prins; 1♂, 1♀, Tarurabta, 1.VI.1945, leg. Rungs (MNHP); ALGERIA: 1♂, Masser, Mines, Lalla-Marnia, June 19.1914, leg. Faroult (NHMW); 2♂, 1♀, Lambeze (MGAB); TUNISIA: 1♂, 1♀, El Kef area, 14.V.1988, Zool. Mus. Copenhagen Exp. (ZMUC); 1♂, 1♀, Tunis, April, coll. Wagner (NHMW); 1♂, Kasserine 5.1999, leg & coll. Bläsius; 1♂, Makter, 1000 m, 6.VI.2000, leg. Bläsius (CAK).

B. powelli was described from Djebel-Timhadit, Morocco, but placed into synonymy with *B. appendiculata* later (Heppner 1981). However, male *B. powelli* can be distin-

guished from the latter by the shape of the male antenna (processes short and broad in *B. powelli*, long and narrow in *B. appendiculata*) and the usually dark colour of the hindwing fringe (white in *B. appendiculata*). Female *B. powelli* differ by the shining black colour of the wings (brownish black in *B. appendiculata*).

B. powelli was reported only from Morocco, although it is as widespread in Algeria and Tunisia. Here this species is recorded from Italy, where it was confused with *B. appendiculata* up to now. Beside the data given here, further information on the distribution in Italy were published by Bertaccini & Fiumi (2002). A female *Brachodes* specimen from Spain which was examined in the course of this study was found to very likely to belong to *B. powelli*, too. So far, it has not been possible to locate any specimens of *B. appendiculata* from Europe west of Italy. From this, it can be assumed that records of *B. appendiculata* from Spain (Heppner 1996), indeed relate to *B. powelli*. Further, the identity of a male specimen from Libya (Bengasi, Cyrenaica, 30. III. 1922, leg. Hartert) which is preserved in the NHML needs confirmation.

Remark. The holotype of *B. powelli* could not be traced. However, the figure of the type specimen given in the original description is very characteristic (Oberthür 1922). Moreover, all specimens of the *B. appendiculata* – species group (*sensu* Kallies 2001) which were examined from Morocco were found to belong to only a single species, *i.e. Brachodes powelli* (Oberthür, 1922).

Brachodes nanetta (Oberthür, 1922) (fig. 4)

Material. SPAIN: 2♂, Sierra Nevada, Camino de la Veleta, 1600 m, 19./21.VII.1985, leg. Baldizzone & Traugott-Olsen (ZMUC); 1♀, Cantabria, Potes, 4.5 km W San Pelaya, 400 m, 24.VII.1986, leg. Richter & van Nieukerken [netted at dusk, *Quercus ilex* shrub & cult. area] (NNHM; CAK); 1♂, Monte dos Alhos, Col. Passos Carvalho, 26.VII.1978 (NHML); 1♂, Zaragoza, VII.1920 (Fig. 4, CAK); PORTUGAL: 1♂, 1♀, Monchique, 400–900 m, 23.–30.VII.1938, leg. Zerny (NHMW); 1♂, Coimbra (CAK); 1♂, 1♀, Algarve, Aljezur, 8.–22.VII.2001, leg. Brandstetter (coll. Brandstetter, CAK); 2♂, Algarve, Fortes Rib. de Odeleite, 23.V.2001, leg. et coll. Corley.

Material from outside Europe. MOROCCO: 1♂, 1♀, Dj. Laxchab, 1500 m, 10.–15. VII. 1941, leg. Marten (NHMW).

B. nanetta was described and reported only from the Atlas Mts, Morocco. It is here recorded from Europe (Spain and Portugal) for the first time. *B. nanetta* is similar to *B. nana*, which, however, does not occur in the western Mediterranean region. Males can be distinguished most easily by the proboscis which is well developed in *B. nanetta* but absent in *B. nana* and by the colour of the hindwing (with distinct light areas near the base of the hindwing in *B. nanetta*; absent or undefined in *B. nana*). Females differ in the colour of the wings (blackish brown, with white markings at costa and anal margin in distal half in *B. nanetta*; without markings in *B. nana*). Records of *B. nana* from Spain and Portugal (Heppner 1996) relate to *B. nanetta*.

Remark. The holotype of *B. nanetta* could not be traced. However, the figure of the type specimen given in the original description is quite characteristic (Oberthür 1922). Moreover, all specimens of the genus *Brachodes* – except for *B. powelli* – which were examined from the Atlas Mts of Morocco were found to belong to only one species, *i.e. Brachodes nanetta* (Oberthür, 1922).

Brachodes beryti (Stainton, 1867) (figs 5, 6)

Material. GREECE: 4♂, 1♀, Peloponnesos, Zachlorou, Kalavrita, 13.–30.VI.1958, leg. Klimesch (Fig. 5, ZSM); 1♂, Ipiros, Igumenitsa, 0 m, ultimo VII.1994, leg. Selling (ZMUC); 1♂, Peloponnesos, Taygetos, Tseria, 18.VII.1992, leg. Dobrovsky (CKS); 1♀, Peloponnesos, Tenaro, 17.VI.1997, leg. Laštùvka (CKS).

Material from outside Europe. LEBANON: 1♂, Beskinta, 16. VIII. 1928, leg. Ebner (NHMW); ♂,♀, Beirut, 1869, coll. Lederer (MNHB); 1♂, Ghazir (CAK); TURKEY: 1♂, Aintab (MGAB), 1♂, Hadjin, 1888, leg. Korb; 1♂, Taurus, 1888, leg. Korb (both MNHB); 1♀, Antalya, Gülük Dagi Termessos, 800 m, 5. VII. 1996, leg. Lingenhöle (Fig. 6, CAK); 1♂, Hatay Prov., Belen, 26. VI. 1993, leg. Bakowski (CAK).

This species was described from the environment of Beirut, Lebanon. Here it is reported from Europe (Greece) and Turkey for the first time.

B. beryti is similar and closely related to *B. nana* (Treitschke, 1834) which was described from Sicily but is apparently more common in Greece and other parts of the southern Balkan peninsula. Male *B. beryti* can be distinguished by the greyish brown colour of the wings (yellow-brownish in *B. nana*), by the distinct light areas near the base of the hindwing (absent or undefined in *B. nana*), and more importantly by the antenna (tapered, relatively smooth, somewhat flattened in *B. beryti*; equally broad for almost the entire length, rough, not flattened in *B. nana*). Females can be separated easily by the colour of the wings (blackish brown, with white markings at costa and anal margin in distal half in *B. beryti*; brown, without markings in *B. nana*).

Conclusions

The additions to the fauna of the European Brachodidae presented in this article appear well consistent. Both, *B. tristis* and *B. beryti* are species with levantino-mediterranean distribution, a range type which often extends into the southern Balkan peninsula, whereas *B. powelli* and *B. nanetta* show a south-west-mediterranean distribution which frequently includes the Iberian peninsula and/or southern Italy. With respect to the Brachodidae fauna, the western part of Europe now can be regarded as relatively well-explored. In eastern Europe, however, the occurrence of additional and even undescribed species is conceivable, especially in the xerothermic grasslands of southern Russia and on the Balkan peninsula.

Recent research on the Palearctic Brachodidae has yielded several taxonomic changes, descriptions of new species and a more detailed knowledge of the species distribution (Kallies 1998, 2001; Zagulajev 1999) although, even concerning the European fauna, several taxonomic problems remain unsolved. Likewise, knowledge of the life cycle of *Brachodes* moths is still incomplete and the early stages have not been described in detail. Sampling of Brachodidae is hampered by the rapid flight of the heliophile adults and the endophagous cryptic life of the larvae. As demonstrated for clearwing moths (Sesiidae) the use of artificial sexual attractants could prove to be helpful in field research on Brachodidae and would likely result in the discovery of additional species in Europe. This approach is hindered, however, by the lack of identified Brachodidae pheromone compounds. To increase the knowledge on the European and Palearctic Brachodidae, basic research on the bionomics and pheromone reaction of Brachodidae is urgently needed.

Figs. 1–6. *Brachodes* species. **1** – *B. tristis* ♂, Greece, alar exp. 23 mm (ZSM). **2** – *B. tristis* ♀, Greece, alar exp. 18 mm (CAK). **3** – *B. powelli* ♂, Morocco, alar exp. 21 mm (CAK). **4** – *B. nanetta* ♂, Spain, alar exp. 19 mm (CAK). **5** – *B. beryti* ♂, Greece, alar exp. 19 mm (ZSM). **6** – *B. beryti* ♀, Turkey, alar exp. 23 mm (CAK).

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